

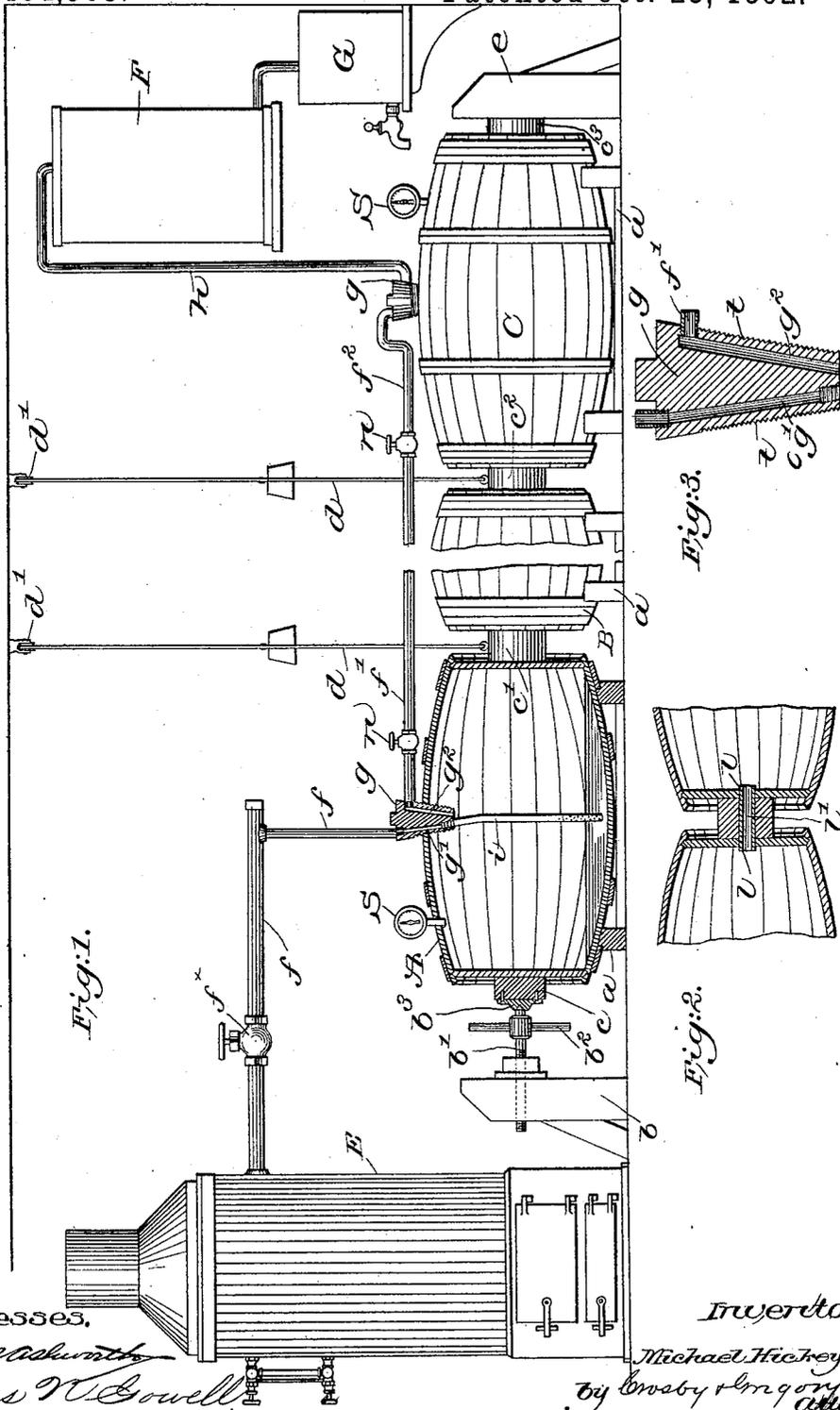
(No Model.)

### M. HICKEY.

## APPARATUS FOR AND METHOD OF RECOVERING WASTE ALCOHOL FROM LIQUOR CASKS.

No. 484,963.

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Witnesses,  
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# UNITED STATES PATENT OFFICE.

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APPARATUS FOR AND METHOD OF RECOVERING WASTE ALCOHOL FROM LIQUOR-CASKS.

SPECIFICATION forming part of Letters Patent No. 484,963, dated October 25, 1892.

Application filed August 5, 1892. Serial No. 442,279. (No model.)

*To all whom it may concern:*

Be it known that I, MICHAEL HICKEY, of Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in Apparatus for and Methods of Recovering Waste Alcohol from Liquor-Casks, &c., of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

Wines and liquors in bulk are stored in wooden casks and barrels, and quite a large percentage of the contained alcohol is absorbed by the wood of which the casks are made. If the interior of the cask has been charred, as is very common, the percentage thus absorbed is even greater, owing to the porous nature of the charred wood. Casks and barrels have been cleaned by introducing steam therein and volatilizing the alcohol absorbed, the alcohol then passing off in the form of vapor with the escaping steam. So far as I am aware, no effort has heretofore been made to reclaim this alcohol; and this invention has for its object the construction of an apparatus for recovering waste alcohol from liquor-casks, and the method carried out by such apparatus also forms a part of my invention.

Figure 1, in side elevation and partly in section, shows one form of apparatus for carrying out my invention. Fig. 2 is a detail to be described, and Fig. 3 is an enlarged sectional view of a form of bung used in connection with the apparatus shown in Fig. 1.

As shown in Fig. 1 of the drawings, a series of barrels or casks A B C are shown as placed end to end and resting on cradles *a*, of usual construction, the cradles being placed on the floor of the room. A bulk-head *b*, rigidly secured to the floor, has, as herein shown, projecting from its face a threaded rod *b'*, provided with a hand-wheel *b<sup>2</sup>*, the outer end of the rod bearing against a seat *b<sup>3</sup>*, attached to a head-block *c*, having its ends preferably rounded, said block pressing against the adjacent head of the barrel A. Any suitable adjusting device may be used in place of the screw and hand-wheel herein shown. Similar head-blocks *c'* *c<sup>2</sup>* are placed between the contiguous heads of every two barrels for a purpose to be described. The intermediate head-blocks *c'* *c<sup>2</sup>* may be attached to weighted cords

*d*, passing over pulleys *d'*, attached to the ceiling, drawing the blocks up out of the way when not in use. An abutment *e* at the opposite end of the row of casks or barrels carries, preferably, a fixed head-block *c<sup>3</sup>* to cooperate with the outer head of the last cask. When the row of barrels or casks is in place, with a head-block between each two barrels, rotation of the hand-wheel *b<sup>2</sup>* turns the threaded rod *b'*, and the head-block *c* is pressed against the head of barrel A, the pressure being communicated through the row of barrels to the abutment *e*, and thereby keeping all of the casks or barrels in position. A generator E for steam or other heating medium is in communication with barrel A by means of a pipe *f*, provided with a suitable stop-cock *f<sup>x</sup>*, said pipe being attached to the bung *g*, (shown in section, Fig. 3,) the duct *g'* therein being continuous and conveying the heating medium into the interior of the barrel into which the bung is secured, preferably by the screw-thread *t*. The bung is also provided with a second duct *g<sup>2</sup>*, the duct *g'* being the inlet and *g<sup>2</sup>* the outlet passage. Leading from the outlet-duct *g<sup>2</sup>* a pipe *f'* extends to the inlet-passage of a similar bung (not shown) in the barrel B, from the outlet of which leads the pipe *f<sup>2</sup>* to the bung of the next barrel C, said pipes *f'* and *f<sup>2</sup>* being provided with suitable stop-cocks *n*. The barrel B is broken away to save space in the drawings. Herein only three barrels are shown connected; but it is evident that any convenient number (more or less) may be so treated. From the outlet-passage of the bung in the last barrel of the series a pipe *h* leads to the worm of the condensing apparatus F, of usual construction, having a receptacle G to receive the condensed product. If the cask be a large one, it is preferable to convey the entering steam or other heating medium to a lower point therein than the inner end of the bung, and a pipe *i* of suitable length is screwed into the inner end of the inlet-passage *g'* of the bung. The pipe *i* may be open at its lower end or closed and provided thereat with a series of perforations.

In operation steam or other heating medium is admitted from the generator to the first cask of the series under a pressure of from thirty to thirty-five pounds, if steam be the medium, by the pipe *f* and bung, as described, the steam

filling the cask and volatilizing more or less of the absorbed alcohol. In the passage of the heating medium to the next cask this volatilized alcohol is carried over with it, and so on through all of the casks to the end of the series, being conveyed thence to the condenser F, where the alcohol is condensed and recovered. The circulation of the heating medium is kept up for any desired length of time, though the average time required to thoroughly clean the casks varies from one-half hour to one hour. The time required to properly and thoroughly clean the casks depends largely upon the number and size of casks treated, the greater the number and size the longer the time required. The water collecting in the casks, formed by condensation, partakes of the flavor of the liquor which had been in the cask and may be used for flavoring extracts, for medicinal use, &c. As the heads of the casks are comparatively thin, they might twist or warp under the pressure of the introduced heating medium, and the head-blocks are employed to counteract any such tendency.

Instead of connecting the bungs of adjacent barrels a hole may be made in the head to receive one of the teats *l* at the ends of a passage *l'* through the modified form of head-block shown in Fig. 2, the other teat being inserted in a hole in the head of the contiguous cask.

When the modified form of head-block is used, the heating medium will enter the first cask by a bung having an inlet-passage only. After being subjected to this treatment the casks are perfectly sweet and clean, not only the alcohol having been expelled and thereafter recovered, but the acetic acid and fusel-oil are driven off by the heat of the medium, making casks so treated even better than new ones, which have more or less acetic acid in their material, and purifying old casks of fusel-oil, as well. It is of no consequence what liquor has been contained in the cask, for the herein-described process so thoroughly and completely cleans it that it may be subsequently used to contain liquor of any character, no matter how delicate its nature or flavor.

Instead of using an ordinary condenser and thereafter recondensing the product in an alcohol-still of usual construction until the desired proof is obtained, the alcohol-still may take the place of the condenser and be connected directly to the last cask of the series.

When using a condenser, the product will contain alcohol running as high as ninety-five proof at the beginning of the operation, decreasing to as low a point as desired, according to the length of time consumed. Pressure-gages *S S'* are screwed onto the first and last barrels of the series, respectively, that the pressure may be noted at either point during the operation.

The stop-cocks *n* on connecting-pipes *f' f<sup>2</sup>*

can be used in case of accident to barrels on either side, closing the passage for the heating medium.

In order to hasten the operation, it is sometimes advantageous to apply cold water to the exterior of the casks to cause greater condensation therein.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In an apparatus for recovering waste alcohol from empty liquor-casks, a steam-generator, a series of supports to sustain the casks to be treated, connections between the casks, and a connection between the generator and the series of casks, combined with a condenser and a connection between it and said casks, whereby the heating medium passes successively to the condenser to volatilize and carry over the alcohol absorbed by the wood of said casks, substantially as described.

2. In an apparatus for recovering waste alcohol from empty liquor-casks, a steam-generator, a series of head-blocks in alignment to receive the casks therebetween, and abutments at the ends of the series, a bung for each cask having an inlet and an outlet passage, connections between the outlet-passage of one and the inlet-passage of the next cask, and a connection between the generator and casks, combined with a condenser connected to the end-most of the several casks and a pressure-regulator carried by one of the abutments to adjust the external pressure on the heads of the casks, substantially as described.

3. The herein-described method of recovering waste alcohol from empty liquor-casks, which consists in circulating a heating medium through and in direct contact with the interior of the cask, volatilizing the contained alcohol and partially condensing the medium, withdrawing the medium and combined volatilized alcohol, and condensing the same, continuing the operation until all the alcohol has been recovered, substantially as described.

4. The herein-described method of recovering waste alcohol from empty liquor-casks, which consists in circulating a heating medium through successive casks of a series and simultaneously cooling their exteriors, volatilizing the contained alcohol, condensing the medium and combined volatilized alcohol, and distilling the product, continuing the operation until no more alcohol is obtained, and recovering the water of condensation in each cask as a by-product, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

MICHAEL HICKEY.

Witnesses:

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GEO. W. GREGORY.